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A Study of Selected Objective Factors in College Basketball and their Relationship to Team Success

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A STUDY OF SELECTED OBJECTIVE FACTORS IN COLLEGE BASKETBALL AND THEIR RELATIONSHIP TO TEAM SUCCESS

BY

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RELATIONSHIP TO TEAM SUCCESS

This thesis is approved as a creditable and independent investigation by a candidate for the degree, Master of Science, and is acceptable as meeting the thesis requirements for this degree. Acceptance of this thesis does not imply that the conclusions reached by the candidate are necessarily the conclusions of the major department.

Thesis Advisor Date

Head, Health, Physical Education and Recreation Department Date

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF TABLES

CHAPTER I

INTRODUCTION

Significance of the Study

The game of basketball is complex and is made up of numerous components. There are components on which data can be objectively recorded while others are subjective in being evaluated. Two such components are the degree of player and team motivation and variations in officiating, but many components are reflected in the different objective statistics usually kept on basketball games. Bunn, in dealing with the importance of statistics in basketball, states:

> The soundness, the agressiveness, the carelessness, the accuracy, the alertness, and the qualities of team and individual play are reflected in the shooting record, the number of assists, the number of rebounds, the number of interceptions, the number of fouls, the number of bad passes, and the offensive and defensive record, which are just some of the statistics recorded on a basketball game.[1]

Of the many components of a game, which are most important in winning? Is it rebounding, the number of turnovers, or could it be shooting percentage, or the number of personal fouls committed? Dean states that shooting is the culmination of all offensive effort and scoring is certainly one of the most important objectives of basketball.[2]

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[1]John W. Bunn, The Basketball Coach, (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1961), pp. 125, 128.

[2]Everett S. Dean, Progressive Basketball, (New York: Prentice-Hall, Inc., 1957), p. 124.

Auerbach feels that gaining possession of the ball is vital to winning and that defensive rebounding is the best method of gaining possession.[3] However, there has been little research completed that might contribute insight as to which factors in basketball contribute most to team success. A coach oftentimes does not know what components to work on the most in practice because he is not certain which are the most important. The coach, therefore, has only his personal experience and expert opinions to determine which components are most important.

The intent of this study was to determine the relationship between twenty-one components of a basketball game (independent variables) and the total points scored, point spread, and winning percentage (dependent variables). The study hopefully provides information to coaches as to what variables relate the highest to winning in college basketball. As a player of basketball and as a coach, the results of this study could assist the basketball coach in making decisions as to how much time should be spent on certain aspects of the game during practice.

Statement of the Problem

The primary purpose of this study was to determine the relationship between selected components of basketball and winning. Winning was analyzed in three ways: by total points scored,

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[3]Arnold "Red" Auerbach, Basketball For The Player, The Fan, and The Coach, (New York: Pocket Books, Inc., 1952), p. 64.

point spread, i. e., difference in points between the losing and winning teams, and final won-loss percentage within the North Central Intercollegiate Athletic Conference.

A secondary purpose of this study was to develop regression equations to predict total points scored, point spread, and final won-lost percentage on the basis of the correlations with the independent variables and the intercorrelations between the independent variables.

Hypothesis

1. There is no significant statistical relationship between the selected measurable factors and success in college basketball.

2. A multiple regression equation to significantly predict team success based upon the independent variables cannot be developed.

Delimitations and Limitations

1. Only games played between the schools in the North Central Intercollegiate Athletic Conference during the 1973-74 basketball season were analyzed.

2. Data were collected from a total of 112 games played by the eight North Central Conference teams, thirty-six of which were not analyzed because of incomplete data, making the total number of observations analyzed seventy-six.

3. The statistics utilized in this study were collected by persons appointed by the Sports Information Director or the Sports Information Director himself at each respective North Central Conference School.

4. The factors studied were necessarily limited to those which could be measured as objectively as possible.

Definition of Terms

Independent and dependent variables. Roscoe defines independent and dependent variables in terms of a cause and effect relationship. Variations in the independent variable are presumed to cause variations in the dependent variable. In the prediction situation, the score on the independent variable is used to predict the score on the dependent variable.[4] For example, the more rebounds (independent variable) a team gets, the more likely it would be for that team to be successful (dependent variable). In this study, the dependent variables used were total number of points scored, point differential between teams, and final won-loss percentage. The independent variables used were rebounds, field goals, free throws, turnovers, and fouls, along with several variations of these factors. (See Chapter III for more detailed explanation of variables.)

North Central Intercollegiate Athletic Conference. A league consisting of eight member colleges and universities, all of which are located in Minnesota, Iowa, North Dakota, and South Dakota. The member schools are Mankato State College, University of Northern Iowa, Morningside College, Augustana College, University of South Dakota,

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[4]John T. Roscoe, Fundamental Research Statistics for the Behavioral Sciences, (New York: Holt, Rinehart and Winston, Inc., 1969), pp. 110-111.

South Dakota State University, University of North Dakota, and North Dakota State University. The North Central Conference schools are all a member of Division II, District Five of the National Collegiate Athletic Association (NCAA).

CHAPTER II

REVIEW OF RELATED LITERATURE

The purpose of this chapter was to review related literature and expert opinions relative to the components of basketball and their possible contribution to team success.

Literature Related to Rebounding

The search of the literature revealed that rebounding contributes to team success. Wooden states concerning rebounding:

> More opportunities for possession will come from missed shots than by any other way; therefore, offensive and defensive rebounding must receive a great amount of attention. It has been said often that the team that controls the boards will probably control the game and this statement will usually hold true.[1]

Morris claims that rebounding ability is a consistent predictor of team success and that rebounding ability is 75 percent of basketball.[2]

LaGrand listed in his book four chief indicators of team success. Rebounding skill is one of these indicators. The author feels that his team must control 55 to 60 percent of the rebounds in order to be consistently successful.[3]

Peterson completed a study involving twenty-eight Class A and B high school teams located in Northwestern Missouri. Analyzed were

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[1]John R. Wooden, Practical Modern Basketball, (New York: Ronald Press Co., 1966), p. 212.

[2]Donald Morris, Kentucky High School Basketball, (New York: Parker Publishing Co., 1969), p. 101.

[3]Louis LaGrand, Coaches Guide to Winning Basketball, (New York: Parker Publishing Co., 1967), pp. 177-180.

such measurable factors as free throws, field goal shooting, ball handling errors, jump balls, total players used, personal fouls, and rebounding in relationship to team success. Team success was defined as winning more than fifty percent of its games. Peterson then computed t-ratios for each factor to see if there was a significant difference between the totals of winning and losing teams in these categories. The investigator concluded that all winning Class B teams recorded a significantly greater number of rebounds than the losing teams (significant at .05 level of confidence).[4]

Mouw, in his study analyzing high school teams in California, found by employing t-ratios that the differences in total number of rebounds and the total number of defensive rebounds between winning and losing teams was significant at the one percent level of confidence. The offensive rebound difference between winning and losing teams was significant at the five percent level of confidence.[5]

Literature related to Field Goal Shooting

Dean made this comment concerning good shooting ability:

> Most coaches will say that ball handling and passing rate first among basketball fundamentals, yet it is true that good shooting ability is of such great importance that it will cover up a lot of basketball sins. Since scoring is one of the immediate objectives of basketball and since it is

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[4]Herbert Donald Peterson, "A Study of Certain Objective Factors in High School Basketball and Their Relationship to Team Success" (unpublished Doctoral Dissertation, Indiana University, Bloomington, Indiana, 1952), pp. 115-122.

[5]Robert J. Mouw, "An Analysis of Objective Factors Associated with Interscholastic Basketball Team Success" (unpublished Master's thesis, Long Beach State College, Long Beach, California, 1971), pp. 31-35.

basketball "paydirt," it is necessary that the coach does not slight this department.[6]

LaGrand's four indicators of team success also included shooting percentages. To be a consistent winner, he believed that his teams must shoot 40 to 45 percent.[7]

Wooden summed up the value of shooting as related to other phases of the game very well when he states:

> Regardless of how well you do everything else, if you can't put the ball through the hoop, you are not going to win many ball games against the teams that can. Therefore, shooting practice must be covered every day.[8]

Mouw also analyzed field goal shooting in his study. It was found that the differences in the number of successful field goals and also field goal percentage between winning and losing teams were significant at the one percent level of confidence.[9]

Hobson carried out a study for five consecutive years (1949-1954) analyzing winning and losing college teams during this period of time. Totals were then compiled for both the winning and losing teams based upon 132 games played. Statistics were then compiled on the final score, shooting accuracy, offensive and defensive rebounds, total rebounds, bad passes, violations, losses by ball handling, total losses of ball, jump ball recoveries, interceptions, and personal fouls. Hobson

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[6]Everett S. Dean, Progressive Basketball, (New York: Prentice-Hall, Inc., 1950), p. 124.

[7]LaGrand, loc. cit.

[8]Wooden, op. cit., p. 82.

[9]Mouw, op. cit., pp. 42-45.

did not employ statistical analysis to the data other than to find totals for both winning and losing teams in all categories. The investigator found that the final field goal shooting statistics all favored the winning teams.[10]

Peterson, in his investigation of high school teams, concluded all winning teams tend to take shots in closer and make a higher percentage of their shots than do losing teams. This was not, however, statistically significant and therefore may have been due to chance ($t = 1.664$).[11]

Literature Related to Free Throw Shooting

Free throw shooting (also called foul shooting) was another skill factor that received considerable attention by writers in the profession. LaGrand included free throw shooting percentages together with field goal percentages as one of four chief indicators of team success. Seventy percent was his calculated norm for a consistently successful team.[12]

Dean further states that he estimated fifty percent of all basketball games were won or lost by free throw shooting.[13] Wooden summarized the feelings of other authorities with this comprehensive

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[10]Howard A. Hobson, Scientific Basketball, (New York: Prentice-Hall, Inc., 1955), pp. 126-127.

[11]Peterson, op. cit., p. 123.

[12]LaGrand, op. cit., p. 181.

[13]Dean, op. cit., p. 138.

statement regarding free throw shooting:

> Free throw shooting determines the outcome of so many games during the season that time spent on developing this ability is never wasted. When two evenly matched, conditioned teams participate, the winner in a great majority of the games will be the team that makes the greatest percentage of their free throws.[14]

Peterson found that there was a significant difference between the totals of winning and losing teams in free throws.[15] Hobson's findings also indicate that the total number of free throws made favored the winning teams.[16]

When Mouw analyzed free throws, it was found that the differences in the number of free throws attempted and the number of successful free throws were significant at the one percent level of confidence. Free throw shooting percentage, however, was found not to be statistically significant.[17]

Literature Related to Turnovers

A phase of basketball which seemingly has not been researched extensively and reported in the literature was the skill in ball handling or the number of turnovers in the playing of a basketball game.

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[14]Wooden, op. cit., p. 105.

[15]Peterson, op. cit., p. 124.

[16]Hobson, loc. cit.

[17]Mouw, op. cit., pp. 42-45.

Number one on LaGrand's list of chief indicators of team success was turnovers--the number of times a team loses the ball to the opponent either by a steal, violation, or another miscue. The potential seriousness of a turnover was illustrated by explaining that if a team took possession of the ball eighty times during the course of a game and turned the ball over to the opponent twenty times, this was a turnover rate of twenty-five percent. Once every four times a team received the ball, they gave it back to the opponent. This was potentially an eighty point mistake because a team gave up twenty chances to attempt field goals, or forty potential points. In so doing, this team also gave the opponent twenty more opportunities to score field goals or another potential forty points. LaGrand felt that for his team to be successful, they could not afford to turn the ball over more than ten percent of the time.[18] Rupp, former University of Kentucky basketball coach, also considers passing the most important fundamental of the game.[19]

Smith summarized the aforementioned importance of turnovers in his article by stating:

> Good ball handling on any level of basketball competition is important to team success. It is a known fact that possession of the ball and maintaining possession are vital to team offense; therefore, need for proficiency in handling the ball is paramount in any offense. A mishandled ball could cost a team six points.[20]

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[18]LaGrand, op. cit., pp. 177-181.

[19]Adolf Rupp, "Relationship Between the Type of Pass and Loss of the Ball in Basketball," Athletic Journal, L, (September, 1969), 94, 105-107.

[20]Chuck Smith, "Ball Handling Pays Off," Athletic Journal, XLIX, (October, 1968), 34-37.

Literature Related to Personal Fouls

Fouls create additional scoring opportunities for the opponent, while at the same time posing the threat of loss of a player by the disqualification rule. Baisi, alludes to this fact by commenting:

> Do not foul. A good defensive man who maintains his correct position and keeps working does not need to foul. A poor guard fouls often because his man gets ahead of him. It many times may determine the winner and loser of a ball game.[21]

Jucker, basketball coach at the University of Cincinnati, brought to light the fact that his 1961-62 team was ranked fifth in the nation with the fewest personal fouls per game, and ended up fourth in the nation in defense.[22] Jucker goes on to state:

> Defensive strategy is concerned with preventing offensive scoring. The elimination of defensive fouls is part of percentage basketball, and we strive constantly to cut down on fouling, even though we teach a leech-like pressure defense.[23]

Personal fouls was one of the factors that Mouw analyzed in his research involving high school teams. The investigator concluded that the difference between winning and losing teams in the fouls committed category approached the five percent level of confidence.[24]

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[21] Neal Baisi, Coaching the Zone and Man to Man Pressing Defenses, (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1964) pp. 22-23.

[22] Ed Jucker, Cincinnati Power Basketball, (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1962), p. 16.

[23] Jucker, loc. cit.

[24] Mouw, op. cit., pp. 46-47.

Literature Related to Measuring Success

The National Collegiate Sports Service has compiled totals for all collegiate teams over the past ten years. Scoring margin was found to be the highest indicator of team success over this period of time. Appearing next in order on this list were field goal percentage defense, rebound margin, and field goal percentage offense. Ranking fifth on the same list of indicators of success was total points scored.[25]

Peterson, in completing his study of Class A and Class B high school teams in Missouri, defined winning in terms of a percentage. The investigator separated winning and losing teams by their won-lost percentage. The mark of delineation was set at fifty percent.[26]

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[25]Bill Wall (ed.), The Basketball Bulletin, Quarterly Bulletin of the National Association of Basketball Coaches of the United States, December, 1973 (Jacksonville, Illinois: Production Press, Inc.), p. 10.

[26]Peterson, op. cit., p. 115.

CHAPTER III

METHODS AND PROCEDURE

Study Organization and Source of Data

The primary purpose of this study was to determine the relationship between selected components of a basketball game and team success. An outline of the study and its purpose was presented to the basketball coaches at the November 3, 1973 meeting of the North Central Conference's basketball coaches held in Minneapolis, Minnesota, for their approval or rejection (refer to Appendix A). The coaches of the North Central Conference gave unanimous approval for this study to be completed, as did the Conference Commissioner and the Sports Information Directors. It was agreed that each cooperating school would receive a copy of the results of this study.

Following the approval of the basketball coaches, there was a meeting with all Sports Information Directors at the North Central Conference Holiday Basketball Tournament on December 26-29, 1973. The purpose of this meeting was to establish uniformity and consistency in compiling the essential data for the study. At this time the Sports Information Directors were informed as to which statistics would be needed by the investigator to complete the study.

The necessary data sheets were sent to the investigator after each conference game for the compiling of data. If the investigator did not receive all necessary data following the completion of a game, a letter was written or a telephone call was placed to the cooperating

Sports Information Director requesting the missing data (refer to Appendix B for copy of a complete data collecting form).

The data were collected from each game played within the North Central Conference during the 1973-74 basketball season. Each team played home and away games with each other in the conference. The number of games played by each team was fourteen, multiplied times eight (the number of teams in the North Central Conference), resulting in a total of 112 observations. However, due to incomplete data received on 36 of the conference games, it was decided not to use such data for analysis. Thus the data on a total of 76 games were used for statistical analysis.

Data were obtained from the following schools: Mankato State College, University of Northern Iowa, Morningside College, Augustana College, University of South Dakota, South Dakota State University, University of North Dakota, and North Dakota State University. Only data from conference games were used in this study in order to keep the level of competition as nearly the same as possible. Hobson states, "Conference or league games are most important to both player and coach. Conference games are championship games--hence competition is at its highest in these games."[1]

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[1]Howard A. Hobson, Scientific Basketball, (New York: Prentice-Hall, Inc., 1955), p. 135.

Collection of Data

To accomplish the purpose of this study, the investigator developed a list of twenty-four statistics or components of a basketball game deemed vitally important to team success in basketball. The components were selected by surveying the related literature and by conferring with the basketball coaches at South Dakota State University and his research advisor.

In addition to the importance of the components to winning, two other criteria were employed for the selection of components. These criteria are as recommended by Peterson in the selection of factors used in his study.[2] One criterion was objectivity. The factor must have been such that two or more independent recordings of the same factor were highly uniform. The selected factors which were used by this investigator are the most objective statistics kept on basketball games. For instance, a free throw attempt is a free throw attempt and can be nothing else. An example of one factor which is not completely objective is the determination of an assist. A common definition of assists was developed by the Sports Information Directors who collected the data. In spite of agreement, the ambiguity of the definition allowed for subjectivity in recording data on assists. For this reason, assists were not selected as a component for this study.

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[2] Herbert Donald Peterson, "A Study of Certain Objective Factors in High School Basketball and Their Relationship to Team Success" (unpublished Doctoral Dissertation, Indiana University, Bloomington, Indiana, 1952), pp. 115-122.

Another criterion used in selecting factors was feasibility. The factors selected must have been economical in terms of being easily and accurately measured. The selected factors analyzed in the study were such as to be recorded quickly while the game was in progress. The recorded data was measureable in actual game situations and did not require elaborate equipment for measurement.

The components selected for use in this study were chosen because they were both objective and feasible in their relationship to team success. Consistency was achieved by having only the Sports Information Directors or their appointees collect the data for each observation at their respective school. The Sports Information Directors or their appointees were selected because of their experience and competence in collecting the required data.

Description of Independent Variables (Components)

Percentage of offensive rebounds. An offensive rebound was described as regaining possession of an offensive team's own missed shot. Included were offensive tips where the distinct intention of the player was to tip the ball into the basket or to another teammate.[3] The percentage of offensive rebounds was the total number of one team's offensive rebounds divided by the total number of offensive rebounds by both teams multiplied by 100.

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[3] William T. Lai, Winning Basketball--Individual Play and Team Strategy, (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1955), p. 237.

Percentage of defensive rebounds. A defensive rebound was described as gaining possession of the opponent's missed shot.[4] The percentage of defensive rebounds was the total number of one team's defensive rebounds divided by the total number of defensive rebounds by both teams multiplied by 100.

Number of offensive rebounds. The number of offensive rebounds was the total number of an offensive team's missed shots of which that offensive team regained possession.

Number of defensive rebounds. The number of defensive rebounds was the total number of possessions gained from missed shots by the opposing team.

Number of field goal attempts. A field goal was described as any shot attempted which was not a free throw.[5] The total number of field goals in the current study was the sum total of a team's shots, not counting free throws.

Percentage of field goal attempts. The percentage of field goal attempts was the number of one team's field goal attempts divided by the total number of field goals attempted by both teams multiplied times 100.

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[4]Ibid., p. 224.

[5]Lai, loc. cit.

Percentage of field goals made. The percentage of field goals made was a team's total number of field goals made divided by its total number of field goals attempted multiplied times 100.

Number of free throws made. A free throw was described as a foul shot. A free throw is a shot taken from the free throw line during a dead ball period following a foul by a member of the opposing team.[6] The total number of free throws made was the sum total of one team's made free throws.

Number of free throws attempted. The number of free throws attempted was the total number of free throws attempted by one team during the course of a basketball game.

Percent free throws made. The percent free throws made was the total number of a team's free throws made divided by the total number of free throws attempted by that team, multiplied by 100.

Percentage of total free throws made. The percentage of total free throws made was a team's total number of free throws made divided by the total number of free throws made by both teams, multiplied by 100.

Total number of personal fouls committed. A personal foul occurs when there is body contact between two or more players on opposing teams, i.e., blocking, charging, pushing, holding, and hacking.[7] The total number of personal fouls was the sum total of fouls committed by one team.

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[6]Ibid., p. 227

[7]Lai, op. cit., p. 235

Percentage of personal fouls committed. The sum total of one team's fouls divided by the total number of fouls committed by both teams multiplied by 100, was the percentage of personal fouls committed.

Total number of personal fouls in first half. The total number of one team's fouls in the first half of a basketball game was the total number of personal fouls in the first half.

Percentage of personal fouls in first half. A team's sum total of fouls in the first half divided by the sum total of both team's fouls in the first half, multiplied by 100 was the percentage of personal fouls in first half.

Average number of personal fouls on each starter. The average number of personal fouls on each starter was the total number of fouls committed by each person starting the game divided by five (the number of starters on a basketball team).

Number of players with three or more personal fouls in the first half. The total number of a team's players with three or more fouls at the end of the first half was the total number of players with three or more personal fouls at the conclusion of the first half of a basketball game.

Number of players disqualified on personal fouls. The number of players disqualified on personal fouls was the total number of one team's players who are disqualified from the game at any time because of personal fouls. (The number of personal fouls allowed before disqualification is five.)

Percentage of both team's turnovers. A turnover was described as a breach of the rules, i.e., travelling, illegal dribble, kicking the ball, or staying in one of the time zones too long. The penalty for a turnover is loss of possession of the basketball.[8] The total number of one team's turnovers divided by the total number of turnovers committed by both teams, multiplied by 100 was the percentage of both team's turnovers.

Total number of team turnovers. The sum total of one team's turnovers at the conclusion of a game was the total number of team turnovers.

Homecourt. Homecourt was described as the floor, court, or arena where a basketball team is accustomed to playing all of its games which are scheduled at home. It is a popular belief that the familiar surroundings and number of loyal fans present at home games is advantageous to winning college basketball games.

Definition of Dependent Variables (Components)

Points scored. The points scored was the total number of points accumulated by one basketball team at the conclusion of a game.

Point spread between teams. One team's total points subtracted from its opponents total points was the point spread between the teams. The point differential was positive if the team being analyzed has

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[8]Lai, op. cit., p. 244.

scored more points than the opposing team. The point differential was negative if the team being analyzed has scored less points than the opposing team.

Won-lost percentage. The won-lost percentage was the total number of North Central Conference games won during the 1973-74 season divided by the total number of North Central Conference games played, multiplied times 100.

CHAPTER IV

ANALYSIS AND DISCUSSION OF RESULTS

Organization of the Data for Treatment

The investigator identified twenty-one independent variables as being possible contributors to team success in college basketball. All the independent variables measured were chosen because of their possible contribution to team success. Included were the components of rebounding, field goal shooting, free throw shooting, personal fouls, turnovers, home-court advantage, and variations of these components. The three dependent variables investigated were total points scored, point differential between teams, and final North Central Intercollegiate Athletic Conference won-lost percentage. The means and standard deviations for the twenty-one independent and three dependent variables are found in Table I. Appendix C contains the raw data for the variables.

To make it possible to predict team success on the basis of the twenty-one selected independent variables, a multiple correlation and regression statistical procedure was used to analyze the data.[1] The first step in this procedure was to compute the intercorrelations between each of the independent variables and the correlation between the independent and dependent variables. The multiple regression equations were then developed, beginning with a one variable equation

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[1]Henry E. Garrett, Statistics in Psychology and Education, (New York: Longmans, Green and Company, 1958), pp. 403-404.

TABLE I

MEANS AND STANDARD DEVIATIONS
OF THE SELECTED VARIABLES

	Variable	Mean	Standard Deviation
X_1	Percentage of Offensive Rebounds Both Teams	50.00	11.98
X_2	Percentage of Defensive Rebounds Both Teams	50.00	5.20
X_3	Total Number of Offensive Rebounds One Team	16.61	5.90
X_4	Total Number of Defensive Rebounds One Team	26.79	4.37
X_5	Total Number of Field Goals Attempted One Team	67.70	8.43
X_6	Percentage of Field Goals Attempted Both Teams	50.00	3.60
X_7	Percentage of Field Goals Made One Team	44.55	6.51
X_8	Total Number of Free Throws Made One Team	14.21	5.61
X_9	Total Number of Free Throws Attempted One Team	20.34	7.01
X_{10}	Percentage of Free Throws Made One Team	69.25	10.67
X_{11}	Percentage of Total Free Throws Made Both Teams	50.09	14.35
X_{12}	Total Number of Fouls Committed One Team	20.28	4.56
X_{13}	Percentage of Total Fouls Committed Both Teams	50.00	6.20
X_{14}	Total Number of Fouls in First Half One Team	9.32	2.80
X_{15}	Percentage of Fouls Committed in First Half Both Teams	50.00	9.40
X_{16}	Average Number of Fouls on Each Starter One Team	3.07	0.68
X_{17}	Number of Players with 3 or More Fouls in First Half One Team	1.13	1.08
X_{18}	Number of Players Disqualified by Personal Fouls One Team	1.18	1.02
X_{19}	Percentage of Total Turnovers Committed by Both Teams	50.00	6.08
X_{20}	Total Number of Turnovers by One Team	19.50	4.77
X_{21}	Game Played at Home or Away (1 = Home, 2 = Away)	1.50	0.50
Y_1	Total Number of Points Scored by One Team	74.42	10.88
Y_2	Point Spread Between Teams	0.00	11.41
Y_3	Final NCC Won-Lost Percentage One Team	48.12	24.45

and adding one additional variable in each of the following steps to increase the accuracy of the predictions. A standard error of estimate, multiple correlation coefficient, and variance accounted for in that step were also computed for each step in the equation. The .05 level of confidence was accepted as being the minimal level needed for a statistic to be considered significant. An electronic computer was used to increase the speed and accuracy of this statistical process.

Analysis and Discussion of the Data

Correlation analysis. Table II shows the matrix of zero order correlations. Sixty-four of the 210 intercorrelations were significant at or beyond the .05 level of confidence. A correlation coefficient of .23 was necessary to be significant. Five of the 21 independent variables showed a significant correlation with total points scored. Six of the 21 independent variables correlated significantly with the point differential between teams. Four of the independent variables were found to correlate significantly with final NCC won-lost percentage.

Correlating significantly with the total points scored dependent variable were the percentage of field goals made (.61), the number of field goal attempts (.51), the percentage of defensive rebounds (.33), the number of free throws made (.28), and the percentage of free throws made by one team (.27).

Correlating significantly with the point differential between teams dependent variable were the percentage of defensive rebounds (.63), the percentage of field goals made by one team (.50), the number of defensive rebounds (.39), the percentage of total turnovers (-32),

TABLE II

CORRELATION MATRIX*

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	Y_1	Y_2	Y_3
1	1.00	.07	.64	.02	.35	.60	- .20	.01	.10	- .12	.08	- .04	- .08	- .07	- .13	- .14	- .02	- .15	- .20	- .11	-.31	.07	.13	- .08
2.		1.00	.04	.62	- .09	- .18	.40	.12	.14	- .06	.19	- .10	- .21	.01	.03	- .09	.05	- .14	.17	.10	- .04	.33	.63	.27
3			1.00	.07	.62	.43	- .45	.15	.22	- .08	.05	.05	- .03	.01	- .08	- .04	.04	- .04	- .17	- .09	- .18	.12	.10	.05
4				1.00	.08	- .13	.05	.21	.27	- .10	.09	.18	- .12	.22	.02	.11	.18	.15	.13	.23	- .02	.21	.39	.24
5					1.00	.58	- .16	- .10	- .16	.10	- .17	.06	.22	- .04	.04	- .04	- .02	.08	- .33	- .28	- .20	.51	.03	- .04
6						1.00	- .32	- .23	- .22	- .05	- .28	.20	.35	.06	.08	.05	.12	.06	- .55	- .27	- .33	.01	.03	- .13
7							1.00	- .18	- .20	- .05	- .03	- .19	- .05	- .11	.12	- .10	- .11	- .17	.04	- .12	.01	.61	.50	.21
8								1.00	.93	.48	.63	.37	- .37	.35	- .04	.31	.24	.24	.04	.28	.13	.28	.17	.15
9									1.00	.16	.59	.38	- .42	.34	- .09	.35	.22	.23	.04	.28	.14	.19	.18	.22
10										1.00	.38	.08	- .01	.10	.09	- .04	.13	.03	- .05	.12	- .03	.27	.03	- .08
11											1.00	- .29	- .59	- .03	- .05	- .19	.09	- .27	- .02	.00	.19	.16	.29	.30
12												1.00	.51	.67	.25	.76	.44	.73	- .02	.24	- .09	.07	- .04	- .05
13													1.00	.32	.45	.31	.22	.29	- .02	- .03	- .21	- .07	- .13	- .27
14														1.00	.64	.39	.73	.33	.07	.28	.06	.05	.11	- .04
15															1.00	.07	.38	-.03	.10	.05	.12	.11	.20	- .06
16																1.00	.32	.69	- .01	.14	- .13	.04	- .06	.10
17																	1.00	.26	.00	.19	- .05	.00	.08	.08
18																		1.00	.04	.17	.08	.04	- .23	.01
19																			1.00	.46	.33	- .17	- .32	- .12
20																				1.00	.18	- .14	- .13	- .07
21																					1.00	- .06	-.12	.12
Y_1																						1.00	.52	.21
Y_2																							1.00	.36
Y_3																								1.00

*$r_{.05}(74) = .23$

$r_{.01}(74) = .29$

1 Percentage Offensive Rebounds
2. Percentage Defensive Rebounds
3 Number of Offensive Rebounds
4 Number of Defensive Rebounds
5 Number of Field Goal Attempts
6 Percentage Field Goal Attempts by Both Teams
7 Percentage Field Goals Made-One Team
8 Number of Free Throws Made
9 Number of Free Throws Attempted
10 Percentage of Free Throws Made-One Team
11 Percentage of Free Throws Made by Both Teams
12 Number of Fouls Committed One Team
13 Percentage of Fouls Commited by Both Teams
14 Number of Fouls in First Half One Team
15 Percentage of Fouls Committed First Half-Both Teams
16 Average Number of Fouls on Each Starter
17 Number of Players with 3 or More Fouls-First Half
18 Number of Players Disqualified by Personal Fouls
19 Percentage of Turnovers Committed by Both Teams
20 Number of Turnovers-One Team
21 Game Played at Home or Away
Y_1 Number of Points Scored by One Team
Y_2 Point Spread Between Teams
Y_3 Final NCC Won-Lost Percentage

the percentage of total free throws made by both teams (.29), and the number of players disqualified by personal fouls (-.23).

Correlating significantly with the final NCC won-lost percentage dependent variable were the percentage of free throws made by both teams (.30), the percentage of defensive rebounds (.27), the percentage of fouls committed by both teams (-.27), and the number of defensive rebounds (.24).

It was interesting to note that at least one variation of each main factor analyzed (rebounding, field goal shooting, free throw shooting, personal fouls, turnovers) correlated significantly with at least one of the dependent variables (Table III). Of the five independent variables which significantly related to total points scored, four were variables which involved scoring. It seems only logical to the investigator that this would be the case. The percentage of defensive rebounds was, however, the only independent variable to correlate significantly with all three dependent variables. Studying these correlations, it can be seen that the independent variables which relate to points scored may not relate to point differential or final won-lost percentage or vice versa.

The significant relationship of percentage of defensive rebounds to all three dependent variables was noteworthy. The findings of this study concerning defensive rebounding are consistent with Mouw's conclusions.[2] It was surprising, however, that offensive rebounding did

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[2]Robert J. Mouw, "An Analysis of Objective Factors Associated With Interscholastic Basketball Team Success" (unpublished Master's Thesis, Long Beach State College, Long Beach, California, 1971) pp. 31-35.

TABLE III

TABLE OF SIGNIFICANT CORRELATIONS*

Independent Variable	Total Points Scored	Point Differential	Won-Lost Percentage
Rebounding			
Percentage of Defensive Rebounds	.33	.63	.27
Number of defensive rebounds		.39	.24
Field Goal Shooting			
Percentage of Field Goals Made by One Team	.61	.50	
Number of Field Goal Attempts	.51		
Free Throw Shooting			
Number of Free Throws Made	.28		
Percentage of Free Throws Made by One Team	.27		
Percentage of Total Free Throws Made by Both Teams		.29	.30
Personal Fouls			
Number of Players Disqualified by Personal Fouls		-.23	
Percentage of Personal Fouls Committed by Both Teams			-.27
Turnovers			
Percentage of Total Turnovers by Both Teams		-.32	

*r.05 = .23 r.01 = .29

not correlate significantly with any of the dependent variables. The literature reviewed showed that rebounding was a significant factor to winning, but rebounding as analyzed in the related literature combined both offensive and defensive rebounding into one category for analysis.[3,4]

In the current study, the field goal percentage by one team correlated to the total points scored (.61) and the point differential between teams (.50). Mouw's study showed that the differences between winning and losing teams in totals of field goals made and field goal percentage were significant at the .01 level of confidence.[5] Hobson and Wooden both made statements that illustrate the importance of field goal shooting.[6,7] Dean also indicated the necessity of basketball coaches to drill on the shooting fundamentals during practice.[8]

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[3]Herbert Donald Peterson, "A Study of Certain Objective Factors in High School Basketball and Their Relationship to Team Success" (unpublished Doctoral Dissertation, Indiana University, Bloomington, Indiana, 1952), pp. 115-122.

[4]Louis LaGrand, Coaches Guide to Winning Basketball, (New York: Parker Publishing Co., 1967), pp. 177-180.

[5]Mouw, loc. cit.

[6]Howard A. Hobson, Scientific Basketball, (New York: Prentice-Hall, Inc., 1955), pp. 126-127.

[7]John R. Wooden, Practical Modern Basketball, (New York: Ronald Press Co., 1966), p. 212.

[8]Everett S. Dean, Progressive Basketball, (New York: Prentice-Hall, Inc., 1950), p. 124.

Free throw shooting was another factor considered to be vital to team success.[9, 10, 11] The number of free throws made correlated significantly with total points scored (.28). The percentage of total free throws made by both teams related to point differential (.29) and final won-lost percentage (.30). Whether or not free throw shooting actually accounts for the winning or losing of 50 percent of all basketball games, as Dean says it does, is highly speculative.[12] What is interesting to note is the relationship between many of the factors. For instance, the percentage of total free throws made by both teams intercorrelates significantly but negatively with the number of fouls committed (-.29). It may be concluded from this, that if free throw shooting is vital to team success, then it is also important to keep the other team off the free throw line and vice versa.

Personal fouls is one factor of a basketball game which contributes a negative relationship to success.[13, 14] In other words, the fewer personal fouls that you have, the greater are your chances for success. The percentage of total fouls committed by both teams correlated (-.27) with the final NCC won-lost percentage. The number

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[9]Wooden, op. cit., p. 105.

[10]Peterson, op. cit., p. 124.

[11]Mouw, op. cit., pp. 42-45.

[12]Dean, op. cit., p. 138.

[13]Mouw, op. cit., pp. 46-47.

[14]Neal Baisi, Coaching the Zone and Man to Man Pressing Defenses, (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1964), pp. 22-23.

of players disqualified by personal fouls revealed a significant correlation with the point differential between teams (.23). From the results of this study, it may be concluded that if you can get the opponent's players into foul trouble, you will stand a much better chance of winning the basketball game.

The review of literature indicated the possiblity that turnovers may have a significant negative correlation to success.[15] In fact, number one on LaGrand's list of chief indicators of team success was the number of turnovers.[16] The current study revealed that the percentage of total turnovers committed by both teams correlated significantly (-.32) to the point differential between teams. The investigator's findings concur with Smith in that possession of the ball and maintaining possession is vital to team offense.[17]

Regression equation analysis. The developed regression equations are shown in Tables IV, V, and VI. Table IV contains the developed regression equation to predict the total points scored dependent variable. According to the variance accounted for by the addition of each new variable to the equation, only the first three variables made a significant contribution to the equation (2039.91 Z 8.08). The three variables involved in predicting total

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[15]Adolf Rupp, "Relationship Between the Type of Pass and Loss of the Ball in Basketball," Athletic Journal, L, (September, 1969), 94, 105-107.

[16]LaGrand, op. cit., pp. 177-181.

[17]Chuck Smith, "Ball Handling Pays Off," Athletic Journal, XLIX, (October, 1968), 34-37.

TABLE IV

REGRESSION EQUATIONS DEVELOPED TO PREDICT TOTAL POINTS SCORED

Regression Equation	Standard Error of Estimate	Multiple Correlation	Variance Accounted*
1. $Y_1 = 1.02X_7 + 28.89$	8.67	.61	3321.35
2. $Y_1 = 1.19X_7 + .81X_5 - 33.52$	5.45	.87	3395.02
3. $Y_1 = 1.36X_7 + .89X_5 + .95X_8 - 60.00$	1.32	.99	2039.91
4. $Y_1 = 1.36X_7 + .90X_5 + .95X_8 - .02X_1 - 59.50$	1.32	.99	2.58
5. $Y_1 = 1.33X_7 + .90X_5 + .95X_8 - .02X_1 + .05X_2 - 60.94$	1.31	.99	3.67
6. $Y_1 = 1.33X_7 + .90X_5 + .95X_8 - .02X_8 + .05X_2 - .15X_{17} - 60.83$	1.31	.99	1.80

* Total Variance = 8882.45
MS Variance = 2.01
F.05 (1/54) = 4.02
Minimum variance Needed to Contribute Significantly to the Equation = 2.01 x 4.02 = 8.08

TABLE V

REGRESSION EQUATIONS DEVELOPED TO PREDICT
FINAL WON-LOST PERCENTAGE

Regression Equation	Standard Error of Estimate	Multiple Correlation	Variance Accounted*
1. $Y_3 = .52X_{11} + 22.18$	23.45	.30	4139.52
2. $Y_3 = .53X_{11} + .84X_7 + 15.74$	22.96	.38	2223.24
3. $Y_3 = .68X_{11} + .80X_7 - .52X_{10} + 14.27$	22.52	.43	1955.45
4. $Y_3 = .75X_{11} + .88X_7 - .54X_{10} + 7.01X_{16} - 12.84$	22.18	.47	1599.48
5. $Y_3 = .70X_{11} + .84X_7 - .48X_{10} + 6.26X_{16} + .81X_4 - 32.10$	22.04	.49	898.72

*Total Variance = 44830.07
MS Variance = 492.02
F.05 (1/54) = 4.02
Minimum Variance Needed to Contribute Significantly to the Equation = 492.02 X 4.02 = 1977.92

TABLE VI

REGRESSION EQUATIONS DEVELOPED TO PREDICT
POINT DIFFERENTIAL BETWEEN TEAMS

Regression Equation	Standard Error of Estimate	Multiple Correlation	Variance Accounted*
1. $Y_2 = 1.39X_2 - 69.40$	8.90	.63	3902.93
2. $Y_2 = 1.56X_2 - .83X_{19} - 36.17$	7.41	.77	1862.52
3. $Y_2 = 1.30X_2 - .82X_{19} + .50X_7 - 46.75$	6.80	.81	671.57
4. $Y_2 = 1.32X_2 - .85X_{19} + .46X_7 + .24X_{15} - 55.60$	6.46	.83	365.07
5. $Y_2 = 1.20X_2 - .86X_{19} + .56X_7 + .25X_{15} + .34X_9 - 62.09$	6.07	.86	385.75
6. $Y_2 = 1.11X_2 - .80X_{19} + .72X_7 + .25X_{15} + .32X_9 + .31X_3 - 71.85$	5.90	.87	178.53
7. $Y_2 = 1.08X_2 - .79X_{19} + .68X_7 + .25X_{15} + .37X_9 + .28X_3 - 1.38X_{18} - 68.10$	5.78	.88	132.18
8. $Y_2 = .89X_2 - .79X_{19} + .73X_7 + .25X_{15} + .35X_9 + .29X_3 - 1.64X_{18} + .31X_4 - 68.41$	5.73	.88	71.70

TABLE VI (Continued)

Regression Equation	Standard Error of Estimate	Multiple Correlation	Variance Accounted*
9. $Y_2 = .75X_2 - .86X_{19} + .82X_7 + .27X_{15} + .24X_9 + .59X_3 - 1.29X_{18} + .47X_4 - .27X_5 - 52.13$	5.58	.89	141.25
10. $Y_2 = .70X_2 - .86X_{19} + .86X_7 + .26X_{15} + .17X_9 + .71X_3 - 1.19X_{18} + .56X_4 - .34X_5 + .10X_{10} - 55.81$	5.52	.89	72.65
11. $Y_2 = .67X_2 - .86X_{19} + .88X_7 + .26X_{15} + .07X_9 + .74X_3 - .74X_{18} + .57X_4 - .35X_5 + .08X_{10} + .08X_{11} - 56.34$	5.52	.90	33.42
12. $Y_2 = .66X_2 - .82X_{19} + .90X_7 + .20X_{15} - .10X_9 + .76X_3 - 1.51X_{18} + .56X_4 - .34X_5 + .05X_{10} + .16X_{11} + .41X_{12} - 62.23$	5.49	.90	50.23

TABLE VI (Continued)

Regression Equation	Standard Error of Estimate	Multiple Correlation	Variance Accounted*
13. $Y_2 = .65X_2 - .82X_{19} + .90X_7 + .23X_{15} - .15X_9 + .79X_3 - 1.47X_{18} + .60X_4 - .36X_5 + .05X_{10} + .18X_{11} + .52X_{12} - .79X_{17} - 64.30$	5.49	.90	34.62
14. $Y_2 = .64X_2 - .83X_{19} + .92X_7 + .21X_{15} - .18X_9 + .90X_3 - 1.61X_{18} + .60X_4 - .38X_5 + .04X_{10} + .20X_{11} + .57X_{12} - .81X_{17} - .07X_1 - 61.68$	5.49	.90	28.23
15. $Y_2 = .45X_2 - .62X_{19} + 1.16X_7 + .19X_{15} - .11X_9 + 1.21X_3 - 1.35X_{18} + .82X_4 - .60X_5 + .07X_{10} + .23X_{11} + .40X_{12} - 1.18X_{17} - .25X_1 + 1.03X_6 - 112.26$	5.32	.91	139.64
16. $Y_2 = .40X_2 - .62X_{19} + 1.19X_7 + .18X_{15} - .56X_9 + 1.26X_3 - 1.48X_{18} + .86X_4 - .63X_5 - .03X_{10} + .24X_{11} + .43X_{12} - 1.19X_{17} - .25X_1 + 1.07X_6 + .60X_8 - 105.32$	5.34	.91	14.67

TABLE VI (Continued)

Regression Equation	Standard Error of Estimate	Multiple Correlation	Variance Accounted*
17. $Y_2 = .41X_2 - .62X_{19} + 1.19X_7 + .15X_{15} - .50X_9 + 1.27X_3 - 1.36X_{18} + .85X_4 - .63X_5 - .01X_{10} + .25X_{11} + .37X_{12} - 1.47X_{17} - .26X_1 + 1.10X_6 + .48X_8 + .26X_{14} - 108.34$	5.38	.91	4.84

*Total Variance = 9767.94
MS Variance = 30.87
F.05 (1/54) = 4.02
Minimum Variance Needed to Contribute Significantly to the Equation = 30.87 X 4.02 = 124.10

points scored are the total number of field goals attempted, the percentage of field goals made by one team, and the number of free throws made by one team. The variance accounted for by the addition of variables beyond the first three was not significant ($2.58 < 8.08$, $3.67 < 8.08$, $1.80 < 8.08$). This would seem to indicate the use of equation number three or any subsequent equation depending upon the amount of time available and accuracy of the prediction desired. The multiple correlation for equation three was .99, which indicates that the total points scored can be predicted very accurately from this equation because 98.6 percent of the variance can be accounted for. Since all three variables are scoring variables, however, the equation has little meaning to the basketball coach because scoring components are expected to relate highly to total points scored.

Table V contains the developed regression equation for the prediction of final North Central Conference won-lost percentage. Only the first two variables (percentage of total free throws made by both teams and percentage of field goals made by one team) make a significant contribution to the equation ($2223.24 \geq 1977.92$). Beyond the second variable, the variance accounted for by the addition of variables was not significant ($1955.45 < 1977.92$, $1599.48 < 1977.92$, $898.72 < 1977.92$, etc). The multiple correlation, however, is only .38 for the first two variables and therefore the accuracy of the equation is limited. Even with the addition of three more variables, the multiple correlation only reaches a .49 value and can account for only 24.1 percent of the variance. Therefore, although it is possible to significantly predict won-lost percentage, it is not accurate enough to be useful.

The developed regression equation for predicting point differential between teams is shown in Table VI. A look at the variance accounted for by the addition of each new variable to the equation reveals that the first fifteen variables make a significant contribution to the equation ($139.64 \geq 124.10$). The variance accounted for by the addition of variables beyond the first fifteen was not significant ($14.67 < 124.10$, $4.84 < 124.10$, etc.). Since the variance accounted for reaches its most significant point in equation fifteen, fifteen variables can be used to significantly predict the point differential between teams. However, if one wished to predict point differential with fewer variables than fifteen, equation five, six, or seven could be used and still obtain accuracy since the multiple correlations equaled .86, .87, and .88. These equations can account for 73.6, 75.4, and 76.8 percent of the variance, respectively. This investigator was especially interested in the regression equations to predict point differential between teams because of what the point differential means--the actual winning or the losing of a basketball game. The variables in order of importance in predicting point differential are shown in Table VII.

Jucker alluded to the value of good defense in relation to causing turnovers.[18] This investigator would also like to emphasize the part that a good, strong, effective defense may play in affecting the selected variables. Looking only at the dependent variable of

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[18] Ed Jucker, Cincinnati Power Basketball, (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1962), p. 16.

TABLE VII

RANKING OF VARIABLES BY IMPORTANCE IN PREDICTING POINT DIFFERENTIAL

	Variable	Percentage of Variance Accounted for by Addition of Variable	Cumulative Percentage of Variance Accounted For	R
X_2	Percentage of Defensive Rebounds	40	40	.63
X_{19}	Percentage of Total Turnovers Committed by Both Teams	19	59	.77
X_7	Percentage of Field Goals Made by One Team	7	66	.81
X_{15}	Percentage of Fouls Committed in First Half by Both Teams	4	70	.83
X_9	Total Number of Free Throws Attempted	4	74	.86
X_3	Total Number of Offensive Rebounds	2	76	.87
X_{18}	Number of Players Disqualified by Personal Fouls	1	77	.88

point differential between teams, the independent variable ranking the highest in predicting this dependent variable is the percentage of defensive rebounds. This variable is a direct product of effective defense--the better defense played, the poorer the shot taken, which consequently results in more defensive rebounds. The same conclusion could be drawn concerning the percentage of total turnovers committed which ranked second in importance in predicting point differential. Offensive statistics many times comprise the majority of records kept on a basketball game, and certainly they are important, but defensive

effectiveness also plays a part in determining the outcome of a game, The current study reveals that 59 percent of the variance in predicting the point differential between teams is accounted for by defensive related statistics.

It is interesting to note that in many instances the independent variable correlating significantly with the dependent variables is a percentage statistic. This would seem to indicate that it is not always the number of a certain factor a team obtains which is most important, but that it obtains a greater percentage of that factor than the opposing team. A team may retrieve 35 defensive rebounds, but this is only meaningful to them in relation to the opposing teams number of defensive rebounds. The number alone is not as important as when it is put into a relative quantity such as a percentage of the total.

The null hypotheses state that (1) there is no significant statistical relationship between the selected measurable factors and success in college basketball, and (2) a multiple regression equation to significantly predict team success based upon the independent variables cannot be developed. The first hypothesis was rejected because fifteen independent variables showed a significant correlation with success in basketball. The second hypothesis was rejected since the variance accounted for in the third equation for the prediction of total points scored ($2039.91 \geq 8.08$), the fifteenth equation for the prediction of the point differential between teams ($139.64 \geq 124.10$), and the second equation for the prediction of the final won-lost percentage ($2223.24 \geq 1977.92$) were all above the necessary level for significance at the .05 level of confidence.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purposes of this study were to determine the relationship between selected components of a basketball game and team success and to develop regression equations to predict team success. Team success was measured by point spread, total points scored, and final won-lost percentage.

Seventy-six North Central Intercollegiate Athletic Conference games (1973-1974 season) were the source of the data. The independent variables analyzed were the components of rebounding, free throw shooting, turnovers, personal fouls, field goal shooting, and a number of variations of these factors. From the intercorrelations between these independent variables and their correlations with the three dependent variables, regression equations were developed for the purpose of predicting team success in basketball.

The results of this study revealed that five variables related significantly to total points scored. These variables included the percentage of field goals made by one team (.61), the number of field goal attempts (.51), the percentage of defensive rebounds gained (.33), the number of free throws made (.28), and the percentage of free throws made by one team (.27).

Six variables related significantly to the point differential between teams. The variables are the percentage of defensive rebounds gained (.63), the percentage of field goals made by one team (.50), the

number of defensive rebounds gained (.39), the percentage of turnovers committed by both teams (-.32), the percentage of free throws made by both teams (.29), and the number of players disqualified by personal fouls (-.23).

Four variables related significantly to the final North Central Intercollegiate Athletic Conference won-lost percentage. These variables were the percentage of free throws made by both teams (.30), the percentage of defensive rebounds gained (.27), the percentage of fouls committed by both teams (-.27), and the number of defensive rebounds gained (.24).

Total points scored can be significantly predicted from a combination of three independent variables. The three variables are the percentage of field goals made by one team, the number of field goals attempted, and the total number of free throws made. The multiple correlation of the three variables with the total points scored was .99.

The point differential between teams can be significantly predicted from a combination of fifteen independent variables. These variables are the percentage of defensive rebounds gained, the percentage of turnovers committed by both teams, the percentage of field goals made by one team, the percentage of fouls committed in the first half, the number of free throws attempted, the number of offensive rebounds gained, the number of players disqualified by personal fouls, the number of defensive rebounds, the number of field goals attempted, the percentage of free throws made by one team, the percentage of free throws made by both teams, the number of fouls committed, the number of players with three or more fouls in the first half, the percentage of

offensive rebounds, and the percentage of field goals attempted by both teams. The multiple correlation of the fifteen variables with point spread was .91. Point spread can, however, be predicted from fewer variables. The multiple correlation of just the first five variables with point spread was .86.

The final NCC won-lost percentage can be significantly predicted from a combination of two independent variables. The two variables were the percentage of free throws made by both teams and the percentage of field goals made by one team. The multiple correlation of the two variables with the won-lost percentage was .38.

Conclusions

The results revealed that:

1. Fifteen of the measurable components of a basketball game do relate significantly with team success.

2. Defensive rebounding is one component which relates to all three measures of team success.

3. All three measures of team success can be significantly predicted from the independent variables analyzed. However, only total points scored and point differential between teams can be accurately predicted.

Implications

The results of the study concerning the prediction of the point differential between teams implies that the basketball coach should emphasize especially the first five variables in his practice sessions. These first five variables again are variations in the components of

defensive rebounding, turnovers, field goal shooting, personal fouls, and free throw shooting.

The fact that 59 percent of the variance in predicting point differential can be accounted for by two defensive related components, emphasizes the importance of a strong defense in achieving team success. This supports the old adage that "offense sells tickets while defense wins games." The basketball coach must formulate a coaching theory which relates to the importance of defense in relation to his offensive strategy.

The results of this study emphasized to the investigator the importance of keeping accurate statistics on basketball games. The proper statistics will allow the coach to note the strengths and weaknesses of his team and to follow their overall progress throughout the season.

Recommendations

Based on the findings of this study, the investigator proposes the following recommendations for further study:

1. That a similar study be conducted analyzing either high school, junior college, other college conferences, or professional basketball teams.

2. That a similar study be conducted further analyzing the contribution of home-court advantage to team success.

3. That a study with a similar statistical procedure be conducted in football and baseball, as both of these team sports have many objective factors which could be analyzed.

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APPENDICES

APPENDIX A

OUTLINE AND PURPOSE OF STUDY PRESENTED TO COACHES

Dear Coach:

Enclosed is a proposal for a research study which has been accepted by the HPER Department at South Dakota State University for my M. S. thesis.

I am trying to discover which factors of a basketball game relate most highly to team success. The findings of this study may be of value to a coach in deciding exactly which parts of the game a coach needs to emphasize the most in practice. There may be some factors which are very important that coaches may have been overlooking.

I would like to ask for your support in obtaining the statistics I will need to do this study. I would also like to ask you for any suggestions for improvement of the study. For example, you may have some aspects of the game that you would like me to analyze. I would be very happy to include these in this study.

Thank you in advance for your support.

Sincerely yours,

Rick Dohrer

APPENDIX A (Continued)

"A Study of Certain Selected Objective Factors
In College Basketball and Their Relationship
To Team Success"

Significance of the Study. The game of basketball is a complex game made up of numerous components. Some of these components are intangible, but many are reflected in the different objective statistics kept on basketball games.

Of the many components of a game, which are most important in winning? Is it rebounding? Is it turnovers? Or could it be shooting percentage, or fouls, etc? A coach oftentimes does not know what components to work on the most because he doesn't know for sure which is most important. This study may reveal the importance of some aspects of the game that the coaches have heretofore overlooked.

The intent of this study will be to determine the relationship between approximately twenty-five components of a basketball game (independent variables) and total points scored and point spread (dependent variables). The study will provide information to coaches as to what variables relate the highest to winning in the North Central Conference. This will assist the coach in making decisions as to how much time he should work on certain aspects of the game during practice.

Statement of the Problem. The primary purpose of this study is to determine the relationship between selected components of basketball and winning in basketball. Winning will be analyzed in two ways; by

APPENDIX A (Continued)

total points scored and point spread, i.e., difference in points between the losing and winning teams.

A secondary purpose of this study will be to develop regression equations to predict total points scored and point spread on the basis of the correlation with the independent variables.

Procedure. To accomplish the purposes of this study, a temporary list of twenty-five objective statistics or components deemed important by the investigator, the basketball coaches at South Dakota State University, and faculty advisors has been developed. The statistics will be collected for every game every NCC team plays within the North Central Conference this basketball season (1973-74). This will be a total of 112 games. Only the conference games will be used in this study in order to keep the level of competition and other conditions as nearly the same as possible. It is felt that these conditions will balance out and lend credibility to the study, as every conference team plays home and away games against every other team throughout the course of the season.

The investigator would like to have these statistics sent to him after every game in order that he may compile them. These statistics would then be analyzed by means of a computer. Each one of these variables will be used in a correlation matrix to show how high a relationship each has to winning. These will be ranked by the computer to show which variable has the highest relationship to winning, which has the second highest relationship to winning, and on down the list

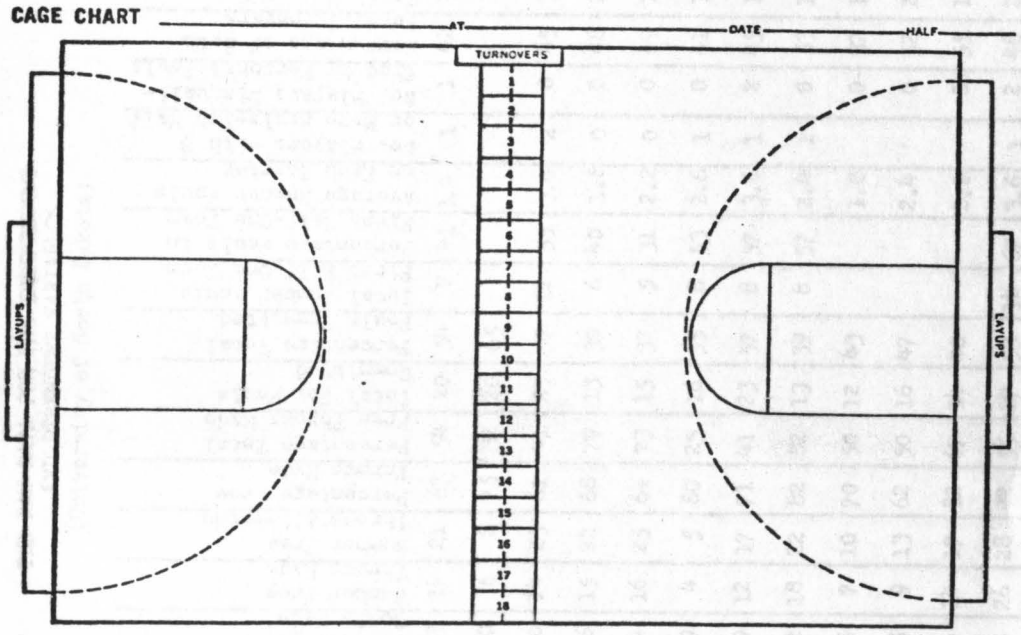
APPENDIX A (Continued)

of variables. If a variable is non-significant to winning, the computer will list it accordingly. For example, if the total number of rebounds turns out to be the most important factor in winning in the North Central Conference through the course of a season, it will be ranked as such. If percentage of total turnovers has the second highest relationship to winning, it will be ranked second. If total number of fouls is not significant to winning in the NCC, it will be listed as non-significant.

It is hoped that the basketball coaches of the North Central Conference will support the study and cooperate in assisting the investigator with the collection of the necessary statistics. Results will, of course, be made available to all NCC schools.

APPENDIX B

DATA COLLECTION FORM



NO.		FG—FGA	FT—FTA	RB	P	TP
		–	–			
		–	–			
		–	–			
		–	–			
		–	–			
		–	–			
		–	–			
		–	–			
		–	–			
		–	–			
		–	–			
		–	–			
		–	–			
		–	–			
TOTALS		–	–			
PERCENTS					TEAM REBOUNDS (NOT IN TOTAL)	

NO.		FG—FGA	FT—FTA	RB	P	TP
		–	–			
		–	–			
		–	–			
		–	–			
		–	–			
		–	–			
		–	–			
		–	–			
		–	–			
		–	–			
		–	–			
		–	–			
		–	–			
		–	–			
TOTALS		–	–			
PERCENTS					TEAM REBOUNDS (NOT IN TOTAL)	

SCORE BY HALVES:
OFFICIALS:
ATTENDANCE:

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APPENDIX C

TABLE VIII

THE RAW DATA FOR THE INDEPENDENT AND DEPENDENT VARIABLES
(University of North Dakota)

Game vs.	Percentage Offensive Rebounds	Percentage Defensive Rebounds	Number Offensive Rebounds	Number Defensive Rebounds	Number Field Goal Attempts	Percentage Field Goal Attempts	Percentage Field Goals Made	Number Free Throws Made	Number Free Throws Attempted	Percentage Free Throws Made	Percentage Total Free Throws Made	Total No. Fouls Committed	Percentage Total Fouls Committed	Total Number Fouls First Half-One Team	Percentage Fouls in First Half-One Team	Average Number Fouls on Each Starter	No. Players with 3 or More Fouls-1st Half	No. Players Disqualified by Personal Fouls	Percentage of Both Team Turnovers	Total No. of One Team's Turnovers	Homecourt	Points Scored	Point Spread Between Teams	Won-Lost Percentage	NCC Record
U. S. D.	49	44	25	24	72	51	33	14	21	67	54	20	54	7	41	3.4	1	1	42	18	Yes	62	- 4		0-1
N. D. S. U.					73	58	40	6	8	75	32	20	65								No	64	-11		0-2
Morningside	57	50	30	28	77	54	40	14	23	61	41	25	57	12	55	3.6	2	0	45	19	Yes	76	+16		1-2
U. N. I.	53	58	16	23	54	48	46	15	22	68	79	13	39	6	40	1.8	0	0	48	20	No	65	+ 9		2-2
S. D. S. U.					62	50	34	16	25	64	73	15	37	5	31	2.2	0	0	49	17	Yes	58	+ 8		3-2
Augustana					66	47	49	4	5	80	25	16	55	8	53	2.6	1	0	41	11	Yes	68	+18		4-2
N. D. S. U.	47	52	22	28	79	54	39	12	17	71	41	23	57	8	57	3.6	1	2	45	19	Yes	74	- 3		4-3
U. S. D.	46	53	11	24	60	47	52	18	22	82	82	13	39	8	57	2.4	1	0	53	17	No	80	+10		5-3
U. N. I.	53	47	16	25	75	53	45	7	10	70	50	12	43			1.8		0	37	14	Yes	75	+14		6-3
Mankato State	50	48	17	34	67	44	55	9	13	62	50	16	47			2.4		0	52	21	Yes	83	+30		7-3
Mankato State	54	51	13	21	57	50	54	14	17	82	67	14	40			2.2		0	55	16	No	76	+19		8-3
Morningside	43	47	16	26	73	52	38	26	28	92	55	27	53	14	67	3.6	1	2	48	24	No	82	+ 1		9-3
S. D. S. U.	26	50	5	29	62	49	52	10	12	83	43	23	57	9	56	3.4	1	1	50	18	No	74	+11		10-3
Augustana	23	52	7	34	55	45	47	12	23	52	43	30	56	11	52	4.2	1	4	54	20	No	64	+ 2		11-3
																								79	

APPENDIX C

TABLE IX

THE RAW DATA FOR THE INDEPENDENT AND DEPENDENT VARIABLES
(North Dakota State University)

Game vs.	Percentage Offensive Rebounds	Percentage Defensive Rebounds	Number Offensive Rebounds	Number Defensive Rebounds	Number Field Goal Attempts	Percentage Field Goal Attempts	Percentage Field Goals Made	Number Free Throws Made	Number Free Throws Attempted	Percentage Free Throws Made	Percentage Total Free Throws Made	Total No. Fouls Committed	Percentage Total Fouls Committed	Total Number Fouls First Half-One Team	Percentage Fouls in First Half-One Team	Average Number Fouls on Each Starter	No. Players with 3 or more fouls-1st half	No. players Disqualified by Personal Fouls	Percentage of both Teams' Turnovers	Total No. of One Teams' Turnovers	Homecourt	Points Scored	Point Spread Between Teams	Won-Lost Percentage	NCC Record
U. N. D.					53	42	59	13	22	59	68	11	35			1.8		0			Yes	75	+11		1-0
U. S. D.					68	47	40	17	23	74	65	15	44	8	47	2.8	1	1	55	24	Yes	71	-2		1-1
Morningside					77	55	51	9	16	56	38	15	45	5	36	1.6	0	0	39	20	Yes	87	+28		2-1
U. N. I.	55	50	18	28	67	52	40	9	15	60	56	9	33	6	38	1.6	0	0	41	11	No	63	+ 8		3-1
Augustana	59	46	13	22	58	47	50	22	31	71	88	15	44	9	50	2.8	2	0	54	15	Yes	80	+ 1		4-1
S. D. S. U.	38	60	12	34	59	44	56	16	23	69	57	16	46	7	64	3.0	1	1	58	18	Yes	82	+16		5-1
U. N. D.	53	48	25	26	66	46	45	17	29	59	59	17	43	6	43	3.2	0	1	55	23	No	77	+ 3		6-1
U. S. D.	63	57	22	34	82	49	46	18	24	75	67	20	50	7	47	3.8	1	2	64	23	No	94	- 7		6-2
Mankato State					79	51	46	25	30	83	76	10	31	3	23	1.6	0	0	40	12	Yes	97	+25		7-2
U. N. I.					72	49	58	13	15	87	81	10	34	5	36	1.8	0	0	50	16	Yes	97	+32		8-2
Mankato State					66	48	50	11	16	69	61	10	37			1.8		0	61	19	No	77	+10		9-2
Morningside	53	53	20	29	68	48	46	17	28	61	71	18	44	9	45	3.0	2	0	52	22	No	77	+2		10-2
S. D. S. U.	25	50	7	26	60	45	48	23	27	85	68	19	43	6	29	3.8	0	1	50	12	No	81	- 2		10-3
Augustana	53	44	18	21	64	51	41	11	19	58	48	23	52	9	45	4.0	2	3	53	17	No	63	-11	71%	10-4

APPENDIX C

TABLE X

THE RAW DATA FOR THE INDEPENDENT AND DEPENDENT VARIABLES
(Augustana)

Game vs.	Percentage Offensive Rebounds	Percentage Defensive Rebounds	Number Offensive Rebounds	Number Defensive Rebounds	Number Field Goal Attempts	Percentage Field Goal Attempts	Percentage Field Goals Made	Number Free Throws Made	Number Free Throws Attempted	Percentage Free Throws Made	Percentage Total Free Throws Made	Total No. Fouls Committed	Percentage Total Fouls Committed	Total Number Fouls First Half-One Team	Percentage Fouls in First Half-One Team	Average Number Fouls on Each Starter	No. Players with 3 or More Fouls-1st Half	No. Players Disqualified by Personal Fouls	Percentage of Both Team Turnovers	Total No. of One Team's Turnovers	Homecourt	Points Scored	Point Spread Between Teams	Won-Lost Percentage	NCC Record
S. D. S. U.	45	58	15	33	58	46	43	17	22	77	52	23	52	10	45	2.8	3	2	55	26	Yes	67	+ 3		1-0
Mankato State	68	63	28	29	83	55	49	14	17	82	50	18	50	10	56	2.2	1	1	44	12	Yes	96	+22		2-0
U. N. I.	64	58	18	35	74	52	47	10	15	67	48	15	47	6	40	1.6	0	0	51	19	Yes	80	+17		3-0
U. S. D.	41	47	9	26	63	51	48	9	15	60	33	27	60	15	58	2.6	3	2	51	28	No	69	-17		3-1
Morningside	52	52	11	28	57	47	53	13	22	59	46	19	46	10	56	2.6	0	1	50	23	No	73	+ 4		4-1
N. D. S. U.	41	54	9	26	65	53	58	3	8	35	12	19	56	9	50	3.8	1	2	46	13	No	79	- 1		4-2
U. N. D.					73	53	26	12	14	86	75	13	45	7	47	2.2	0	0	59	16	No	50	-18		4-3
U. S. D.	55	52	22	25	77	53	49	10	13	77	36	21	53			3.2		2	48	19	Yes	86	+10		5-3
Morningside	60	48	21	29	69	53	39	18	25	72	62	28	61	18	67	4.0	5	2	44	21	Yes	72	+15		6-3
U. N. I.	58	55	14	30	56	51	43	12	19	63	60	13	42	7	47	2.4	1	0	50	22	No	60	+12		7-3
Mankato State	36	55	10	26	57	48	56	11	20	55	55	17	46			2.8			55	17	No	75	+ 8		8-3
S. D. S. U.	29	52	9	33	57	44	47	19	30	63	50	25	45	11	46	3.6	1	1	46	13	No	73	+ 2		9-3
U. N. D.	77	48	23	31	67	55	34	16	29	55	57	24	44	10	48	3.8	2	2	46	17	Yes	62	- 2		9-4
N. D. S. U.	47	56	16	27	62	49	50	12	17	71	52	21	48	11	55	3.2	1	1	47	15	Yes	74	+11	.71	10-4

APPENDIX C

TABLE XI

THE RAW DATA FOR THE INDEPENDENT AND DEPENDENT VARIABLES
(University of South Dakota)

Game vs.	Percentage Offensive Rebounds	Percentage Defensive Rebounds	Number Offensive Rebounds	Number Defensive Rebounds	Number Field Goal Attempts	Percentage Field Goal Attempts	Percentage Field Goals Made	Number Free Throws Made	Number Free Throws Attempted	Percentage Free Throws Made	Percentage Total Free Throws Made	Total No. Fouls Committed	Percentage Total Fouls Committed	Total Number Fouls First Half-One Team	Percentage Fouls in First Half-One Team	Average Number Fouls on Each Starter	No. Players with 3 or More Fouls-1st Half	No. Players Disqualified by Personal Fouls	Percentage of Both Team's Turnovers	Total No. of One Team's Turnovers	Homecourt	Points Scored	Point Spread Between Teams	Won-Lost Percentage	NCC Record
U. N. D.	51	56	26	30	69	49	39	12	20	60	46	17	46	10	59	2.4	2	0	58	25	No	66	+ 4		1-0
N. D. S. U.					77	53	42	9	16	56	35	19	56	9	53	3.0	0	0	45	20	No	73	+ 2		2-0
Morningside					70	50	43	16	23	70	52	17	41	11	48	1.4	1	0	54	21	No	76	+11		3-0
S. D. S. U.	43	43	15	24	68	46	40	19	24	79	58	16	41	6	40	3.0	0	1	52	28	Yes	73	-21		3-1
Augustana	59	53	13	29	60	49	57	18	30	60	67	18	40	11	42	2.6	2	0	49	27	Yes	86	+17		4-1
U. N. I.	32	50	9	24	67	48	54	14	18	78	70	15	47	7	54	2.8	2	1	38	12	Yes	86	+10		5-1
Mankato State	50	56	24	29	81	50	48	12	17	71	50	16	47	6	37	2.6	0	1	49	20	Yes	90	+14		6-1
S. D. S. U.	33	48	13	29	76	47	51	13	19	68	39	26	55	12	63	4.0	1	3	60	25	No	91	+ 1		7-1
Augustana	45	48	18	23	69	47	42	18	24	75	64	19	47			3.4		1	52	21	No	76	-10		7-2
N. D. S. U.	37	43	13	26	85	51	54	9	15	60	33	20	50	8	53	3.4	0	2	36	13	Yes	101	+ 7		8-2
U. N. D.	54	47	13	21	69	53	48	3	4	75	18	20	61	6	43	3.4	0	1	47	15	Yes	70	-10		8-3
Mankato State	58	53	21	31	85	56	39	12	14	86	44	20	54			2.6		0	43	18	No	78	- 1		8-4
Morningside	70	41	32	26	87	58	30	22	31	71	43	27	49	11	38	4.0	2	3	42	18	Yes	74	-17		8-5
U. N. I.	50	53	13	31	67	47	52	10	14	71	53	15	48	9	47	2.6	1	0	58	22	No	80	+ 1	.64	9-5

APPENDIX C

TABLE XII

THE RAW DATA FOR THE INDEPENDENT AND DEPENDENT VARIABLES (Mankato State)

Game Vs.	Percentage Offensive Rebounds	Percentage Defensive Rebounds	Number Offensive Rebounds	Number Defensive Rebounds	Number Field Goal Attempts	Percentage Field Goal Attempts	Percentage Field Goals Made	Number Free Throws Made	Number Free Throws Attempted	Percentage Free Throws Made	Percentage Total Free Throws Made	Total No. Fouls Committed	Percentage Total Fouls Committed	Total Number Fouls First Half-One Team	Percentage Fouls in First Half-One Team	Average Number Fouls on Each Starter	No. Players with 3 or More Fouls-1st Half	No. Players Disqualified by Personal Fouls	Percentage of Both Teams' Turnovers	Total No. of One Teams' Turnovers	Homecourt	Points Scored	Point Spread Between Teams	Won-Lost Percentage	NCC Record
U. N. I.	63	48	27	29	82	54	35	15	20	75	79	18	50	10	53	2.8	2	0	39	12	No	73	+ 9		1-0
S. D. S. U.	45	52	20	23	54	46	44	25	33	76	63	23	48	9	43	3.0	1	1	50	21	No	73	+10		2-0
Augustana	32	37	13	17	68	45	44	14	18	78	50	18	50	8	44	2.2	1	2	56	15	No	74	-22		2-1
U. S. D.	50	44	24	22	80	50	40	12	16	75	50	13	53	10	63	2.6	1	1	51	21	No	76	-14		2-2
Morningside	53	51	17	19	71	50	55	8	15	53	62	14	48	8	67	2.8	0	0	45	10	No	86	+19		3-2
U. N. I.	48	55	12	23	67	52	57	7	11	64	78	11	46			2.0		0	45	15	Yes	83	+19		4-2
U. N. D.	50	52	17	37	85	56	26	9	17	53	50	18	53			3.0		1	48	19	No	53	-30		4-3
N. D. S. U.					77		42	8	12	67	24	22	69	10	77	3.2	1	2	60	18	No	72	-25		4-4
S. D. S. U.	52	52	14	33	61	45	51	14	23	61	54	20	48			3.2		0	54	14	Yes	76	+ 2		5-4
U. S. D.	42	47	15	28	68	44	47	15	20	75	56	17	46			2.8		0	57	24	Yes	79	+ 1		6-4
Morningside	63	46	17	28	59	48	44	10	15	67	56	16	48			3.0		1	50	25	Yes	62	- 4		6-5
N. D. S. U.			13	23	73	52	41	7	9	78	39	17	63			2.8		1	39	12	Yes	67	-10		6-6
U. N. D.	46	49	11	20	57	50	44	7	11	64	33	21	60			3.4		0	45	13	Yes	57	-19		6-7
Augustana	64	45	18	21	63	52	46	9	16	56	45	20	54			3.2		1	45	14	Yes	67	- 8	43	6-8

APPENDIX C

TABLE XIII

THE RAW DATA FOR THE INDEPENDENT AND DEPENDENT VARIABLES
(Morningside)

Game vs.	Percentage Offensive Rebounds	Percentage Defensive Rebounds	Number Offensive Rebounds	Number Defensive Rebounds	Number Field Goal Attempts	Percentage Field Goal Attempts	Percentage Field Goals Made	Number Free Throws Made	Number Free Throws Attempted	Percentage Free Throws Made	Percentage Total Free Throws Made	Total No. Fouls Committed	Percentage Total Fouls Committed	Total Number Fouls First Half-One Team	Percentage Fouls in First Half-One Team	Average Number Fouls on Each Starter	No. Players with 3 or More Fouls-1st Half	No. Players Disqualified by Personal Fouls	Percentage of Both Teams' Turnovers	Total No. of One Teams' Turnovers	Homecourt	Points Scored	Point Spread Between Teams	Won-Lost Percentage	NCC Record
N. D. S. U.					64	45	34	15	20	75	63	18	55	9	64	2.8	1	0	61	31	No	59	-28		0-1
U. S. D.					70	50	36	15	22	68	48	24	59	12	52	3.6	2	2	46	18	Yes	65	-11		0-2
U. N. D.	43	50	23	28	65	46	31	20	29	69	59	19	43	10	45	3.0	1	1	55	23	No	60	-16		0-3
S. D. S. U.	35	45	8	22	61	47	46	24	25	96	68	23	46	14	61	3.2	3	2	56	23	No	81	-10		0-4
Augustana	48	48	10	26	64	53	41	15	17	88	54	22	54	8	44	3.8	2	2	50	23	Yes	69	- 4		0-5
U. N. I.	56	54	15	22	55	44	49	21	28	75	51	25	47	9	43	4.4	0	2	48	20	Yes	75	+11		1-5
Mankato State	47	49	15	18	72	50	44	5	8	63	38	15	52	4	33	2.6	0	0	55	12	Yes	67	-19		1-6
Augustana	40	52	14	32	61	47	36	11	19	58	38	18	39	9	33	3.2	1	2	56	27	No	57	-15		1-7
Mankato State	37	54	10	33	65	52	45	8	12	67	44	17	52			2.4		1	50	25	No	66	+ 4		2-7
N. D. S. U.	47	47	18	26	74	52	46	7	11	64	29	23	56	11	55	3.8	2	1	48	20	Yes	75	- 2		2-8
S. D. S. U.	50	56	10	29	64	53	47	15	21	71	63	17	46	7	50	3.2	0	0	47	23	Yes	75	+ 6		3-8
U. N. D.	57	53	21	29	67	48	67	21	29	72	45	24	47	7	33	4.2	0	3	52	26	Yes	81	- 1		3-9
U. S. D.	30	59	14	37	63	42	49	29	36	81	57	28	51	18	62	3.8	4	2	58	25	No	91	+17		4-9
U. N. I.	59	49	19	30	62	46	45	26	36	72	61	23	44	12	50	3.4	0	1	55	27	No	82	+ 5		5-9
																								36	

APPENDIX C

TABLE XIV

THE RAW DATA FOR THE INDEPENDENT AND DEPENDENT VARIABLES
(South Dakota State University)

Game vs.	Percentage Offensive Rebounds	Percentage Defensive Rebounds	Number Offensive Rebounds	Number Defensive Rebounds	Number Field Goal Attempts	Percentage Field Goal Attempts	Percentage Field Goals Made	Number Free Throws Made	Number Free Throws Attempted	Percentage Free Throws Made	Percentage Total Free Throws Made	Total No. Fouls Committed	Percentage Total Fouls Committed	Total Number Fouls First Half-One Team	Percentage Fouls in First Half-One Team	Average Number Fouls on Each Starter	No Players with 3 or More Fouls-1st Half	No. Players Disqualified by Personal Fouls	Percentage of Both Teams' Turnovers	Total No. of One Teams' Turnovers	Homecourt	Points Scored	Point Spread Between Teams	Won-Lost Percentage	ACC Record
Mankato	55	48	24	21	64	54	38	15	25	60	38	25	52	12	57	3.8	2	1	50	21	Yes	63	-10		0-1
U. N. I.	55	52	23	25	84	55	50	14	19	74	50	18	53	8	50	2.2	0	0	39	12	Yes	98	+22		1-1
Augustana	55	42	18	24	68	54	35	16	24	67	48	21	48	12	55	3.0	2	1	45	21	No	64	- 3		1-2
U. S. D.	57	57	20	32	80	54	50	14	19	74	42	23	59	9	60	2.4	0	0	48	26	No	94	+21		2-2
Morningside	65	55	15	27	68	53	56	15	24	63	38	27	54	9	39	3.8	2	2	44	18	Yes	91	+10		3-2
N. D. S. U.	62	40	20	23	74	56	36	12	21	57	43	19	54	4	36	2.8	0	1	42	13	No	66	-16		3-3
U. N. D.					61	50	36	6	8	75	27	25	63	11	69	4.0	1	3	51	18	No	50	-8		3-4
U. S. D.	67	52	26	32	86	53	41	20	24	83	61	21	45	7	37	2.2	0	3	40	17	Yes	90	- 1		3-5
U. N. I.	46	58	13	29	61	49	43	15	21	71	60	19	51	13	62	3.2	3	1	56	28	No	67	- 1		3-6
Mankato State	48	48	13	31	74	55	42	12	21	57	46	22	52			3.6		1	46	12	No	74	- 2		3-7
Morningside	50	44	10	23	58	47	52	9	13	69	37	20	54	7	50	3.0	0	1	53	26	No	69	- 6		3-8
Augustana	71	48	22	31	71	56	37	19	26	73	50	30	55	13	54	4.0	1	3	54	15	Yes	71	- 2		3-9
N. D. S. U.	75	50	21	26	74	55	49	11	18	61	32	25	57	15	71	3.2	2	1	50	12	Yes	83	+ 2		4-9
N. N. D.	74	50	14	29	63	51	40	13	20	65	57	17	43	7	44	2.2	0	00	50	18	Yes	63	-11	29	4-10

APPENDIX C

TABLE XV

THE RAW DATA FOR THE INDEPENDENT AND DEPENDENT VARIABLES
(University of Northern Iowa)

Game vs.	Percentage Offensive Rebounds	Percentage Defensive Rebounds	Number Offensive Rebounds	Number Defensive Rebounds	Number Field Goal Attempts	Percentage Field Goal Attempts	Percentage Field Goals Made	Number Free Throws Made	Number Free Throws Attempted	Percentage Free Throws Made	Percentage Total Free Throws Made	Total No. Fouls Committed	Percentage Total Fouls Committed	Total Number Fouls First Half-One Team	Percentage Fouls in First Half-One Team	Average Number Fouls on Each Starter	No. Players with 3 or More Fouls-1st Half	No. Players Disqualified by Personal Fouls	Percentage of Both Teams' Turnovers	Total No. of One Teams' Turnovers	Homecourt	Points Scored	Point Spread Between Teams	Won-Lost Percentage	NCC Record
Mankato	37	52	16	32	70	46	43	4	10	40	21	18	50	9	47	2.8	1	1	61	19	Y	64	- 9		0-1
S. D. S. U.	45	48	19	23	69	45	45	14	19	74	50	16	47	8	50	2.0	0	0	61	19	No	76	-22		0-2
Augustana	36	42	10	25	67	48	39	11	14	79	52	17	53	9	60	2.4	1	0	49	18	No	63	-17		0-3
U. N. D.	47	42	14	17	59	52	44	4	5	80	21	20	61	9	60	2.8	1	1	52	22	Yes	56	- 9		0-4
N. D. S. U.	45	50	15	28	62	48	39	7	12	58	44	18	67	10	62	2.6	0	1	59	16	Yes	55	- 8		0-5
U. S. D.	68	50	20	24	74	52	47	6	9	67	30	17	53	6	46	2.4	1	1	62	19	No	76	-10		0-6
Morningside	44	46	12	19	69	56	32	20	27	74	49	28	53	12	57	3.4	1	2	52	22	No	64	-11		0-7
Mankato State	52	45	13	21	63	48	49	2	6	33	22	13	54			2.0		0	55	18	No	64	-19		0-8
S. D. S.	54	42	15	21	62	51	47	10	14	71	40	18	49	8	38	2.8	1	1	44	22	Yes Yes	68	+ 1		1-8
Augustana	42	45	10	25	55	49	36	8	13	62	40	18	58	8	53	2.8	0	1	50	22	Yes	48	-12		1-9
U. N. D.	47	53	14	28	63	47	43	7	10	70	50	16	57			2.6		0	63	24	No	61	-14		1-10
N. D. S. U.					76	51	41	3	4	75	19	19	66	9	64	2.8	1	0	50	16	No	65	-32		1-11
Morningside	41	51	31	73	73	54	41	17	23	74	39	29	56	12	50	4.6	3	4	45	22	Yes	77	- 5		1-12
U. S. D.	50	47	13	28	75	53	47	9	10	90	47	16	52	10	53	2.4	2	0	42	16	Yes	79	- 1	7	1-13